Treatment of A Neurologically Delayed Preadolescent Boy

Integrating Neurofeedback and Trauma-informed Psychotherapy
With EFT, EMDR and HANDLE techniques

By: Myron H. Koch, M.D. and Kip Patterson, Ph.D.

A primary difficulty faced by current diagnosis and case management is often a failure to deal directly with the neurophysiological etiology of the behavioral symptoms that are used as diagnostic criteria.

The integration of Neurofeedback (aka EEG biofeedback) with other therapeutic modalities allows the therapist to address the underlying neurophysiological components of the etiology that have been largely neglected heretofore by psychotherapists. Such an approach requires a more integrated case formulation. Directly addressing neurophysiological deficits and delayed developmental stages with Neurofeedback — as well as addressing, with trauma-informed psychotherapy, the neurophysiological sequelae of traumatic events and inappropriate psychosocial learning— may significantly enhance the probability of a successful outcome.

Integrating Neurofeedback with other treatment modalities also requires on the therapist's part a willingness to be more dynamic and less dogmatic, since as one issue such as anxiety is resolved, another, such as poor attention skills, may be revealed. The therapist must then re-formulate an approach to a particular patient based on the feedback provided by the patient's self-reporting, behavioral changes, as well as reports from the patient's significant others; in effect, successful resolution of problematic issues using Neurofeedback and other forms of psychotherapy may reveal other underlying neurophysiological deficits. The following case study utilizes just such an integrated formulation and therapy regimen. The patient's name has been altered to protect confidentiality.

Initial Presentation

Alec's mother brought him for therapy after reading an article about Neurofeedback in the local newspaper. Her nine-year-old son was very immature and had significant difficulties in school, particularly in special subjects involving sequencing and physical coordination, such as music and gym. In addition, his focus

was too frequently outside the structure of the school program. She complained that he needed constant verbal reminders throughout the day to remain focused on tasks and that he was sleeping in bed with her.

History

The pregnancy was complicated by preeclampsia[1]. Despite a previous delivery by caesarian section, a vaginal delivery was performed resulting in a prolonged and complicated delivery during which Alec's shoulder was dislocated, requiring immediate repair as well as physiotherapy in the delivery room. His Apgar score was 1[2]. He required a chest tube and was maintained on life supports for 5 days before being allowed to leave the hospital.

Despite the preeclampsia, the difficult delivery and need for life supports, he was reported to have been, "a really good baby." He slept and ate well, touch sense and suck response were intact, all indications that basic life processes controlled by the brain stem were intact. Motor functions were intact and —although Mrs. V. was unable to recall the exact times—motor milestones were reportedly achieved at expected rates for normal development, indicating that no anatomical neurological damage was present. It seemed as though the *physical* integrity of the central nervous system had been preserved.

Exciting on one hand, but unfortunately traumatic on the other, was the presence of a high level of Persistence, experienced by his mother as "willfulness." Persistence is one of the nine aspects of inborn temperamental characteristics described by Chess, Thomas

---

[1] For the neurological implications of eclampsia
Ringrose D (1961), on pre-eclampsia, in Psychosomatic Influences In The Genesis of Toxemia of Pregnancy in *Can. M.A.J.* 3/25,1961
Schobel HP, Fischer T, Heuszer K, Geiger H, Schmieder RE. (1996) Preeclampsia: a state of sympathetic overactivity. *N Engl J Med* 1996;335(20):1480-1485.
Mead V P (2007) Timing, Bonding and Trauma: applications from experience-dependent maturation and stress provide insights for understanding environmental origins of disease
In- *Adv Psych Research*, Alexandra M. Columbus ed.,vol. 49. 2007, pp. 14-24

[2] The Apgar score is determined by evaluating the newborn baby on five simple criteria (skin color/complexion, pulse rate, reflex irritability, muscle tone, respiratory effort) on a scale from zero to two, then summing up the five values. The resulting Apgar score ranges from zero to 10. Scores lower than 3 suggest (entail) the possibility of neurological damage.

and Birch in their 20-year longitudinal study[3] of temperament. One is born with them and they remain present throughout one's life. Persistence consists of a tendency to continue an activity or thought pattern over long periods of time. When a child is learning to ride a bicycle it is seen as positive but when the child persists in a behavior such as refusing to use the toilet for bowel movements it is seen as problematic. In a power struggle with the parent it is seen as —and indeed becomes— obstinacy. Mrs. V stated, "There was a great power struggle. He developed encopresis and was treated with laxatives." Unless these characteristics are recognized and adapted to, behavioral problems requiring counseling or treatment of parents and child arise. His tendency to be persistent was incorporated into the therapy so that Alec, when the issue was brought to his attention, could persist in correcting the behavior.

School History

While Alec's first year in nursery school appeared to have gone well, his situation was complicated by the fact that his parents were then in the process of divorce: marital conflict, involving domestic violence, was an important part of the family history at that time. In kindergarten, he began to show "inconsistencies." By the time he was in first grade he was taking 27 mg of Concerta per day, prescribed by his pediatrician; "And he took it for a long time," reported Mrs. V. When that dose failed to resolve the problem, the medication was increased and in his mother's words, "He became a zombie". Asperger's Syndrome was the diagnosis posed by a Psychologist at the local clinic.

This psychiatrist saw Alec for the first time two days after the consultation with his mother. He displayed a striking eagerness to connect and tell his own story. He showed a lot of extraneous foot movements and a lack of continuity in his thinking, which made it difficult to follow what he was saying. When the psychiatrist coughed during that first session, Alec showed an immediate concern for his well-being.

[3] Cf. Chess, Thomas and Birch, Temperament and Behavior Disorders in Children, 1968. Persistence is one of nine temperamental characteristics that are measured in order to establish a temperamental profile. (Your Child Is A Person is the version of the study written expressly as a guide for parents.

Initial Case Formulation:

Alec's initial presentation as a concerned, motivated youngster eager to tell his story partially ruled out the Asperger diagnosis. Neurophysiological damage from the intrauterine trauma as well as the trauma of delivery *could* produce behaviors consistent with an Asperger diagnosis. On the other hand, Alec's willingness to connect socially and his demonstrated concern for his doctor's health mitigated against that diagnosis.

Here was a child traumatized in utero, traumatized during the delivery and further traumatized by the separation from his parents for eight days. In retrospect, it is likely that the stress the mother experienced during the pregnancy affected her autonomic nervous system. This in turn could have affected the child's autonomic nervous system, contributing to the complex of behavioral symptoms with which he presented.[4]

With an impaired autonomic nervous system, Alec had developed inappropriate behaviors. His classmates' consequent derision created interpersonal problems in school, resulting in a profound sense of humiliation. A classroom observation early in the treatment revealed that he was seated separately from his peers, permitting very little if any communication with either the teacher or his peers.

When Alec began treatment, he met the diagnostic criteria for major depression. Suicidal thoughts became a concern when a note from his teacher quoted him as saying, "Maybe Mrs. X can shake my heart out so I can die." and "Maybe I should run away and go die someplace."

[4] Cf. Alan Schore's work on the epigenetic imprinting of maternal stress in the infant's EEG, which now includes effects of *prenatal* disturbances of the bonding between mother and child. In Schore's own words, he "moved Bowlby 's focus back … to birth and actually prenatally. The brain growth spurt is from the last trimester of pregnancy through the second year (…)The idea of 'developmental stages' has been superseded by the more precise concept of critical periods or sensitive periods. These are times of intensified growth – i.e. increased synaptic production – and differentiation."
Veronique P Mead op.cit pp. 14-24 examines the spectrum of prenatal, perinatal and infancy traumas
Cf. also Bruce Perry's Neurosequential Model of Therapeutics

Developmental Trauma Disorder, proposed by Bessel Van Der Kolk in 2009[5], appeared to be the best diagnosis given the complex developmental history and the resulting behavioral symptoms.

The treatment plan for this patient required prioritization including the need for protecting and enhancing developmental maturation. The first step, in this psychiatrist's experience, is quieting the brain with Neurofeedback, reducing the intensity of anxiety interfering with intellectual function. Once the brain has been quieted one may then determine the dysfunctional neurophysiological issues and develop specific protocols to address them. Taking into account the different layers and interacting aspects of the patient's problematic behaviors necessarily involves the integration of other modalities: EFT, EMDR[6] and a course of psychotherapy. The latter would not only involve learning how to negotiate an intimate interpersonal relationship with the psychiatrist but also learning techniques for the auto-regulation of affective states, especially Alec's impulsive urges.

The Therapeutic Course

Alec was seen for a total of 112 sessions; 95 included Neurofeedback.

The first step was to quiet the Limbic System since it can delete cortical processing of sensory inputs under significant stress loads. Many of his behavioral issues had to do with anxiety, many forms of which are processed by the limbic system. Learning is an important part of psychotherapy and anxiety stands in the way of learning. Therefore the first six sessions involved Delta, Theta and Alpha amplitude reduction at FT8-A2[7]. While the analogy of fine-tuning a radio doesn't work completely, the concept of reducing the background static is an appropriate metaphor. The amplitude reduction of the brain's primary frequencies reduces undifferentiated response and increases

[5] Van der Kolk, Bessel Developmental Trauma: towards a rational diagnosis for children with complex trauma histories (2009) http://www.traumacenter.org/products/pdf_files/preprint_dev_trauma_disorder.pdf

[6] See Appendix , brief descriptions of these techniques can be found in the author's website www.myronhkochmd.com

[7] Starting a course of treatment with FT8-A2 is always a good idea; it calms the limbic system and reduces the static in the systems. It is an interesting contrast that Alec was labeled Asperger and treated with Concerta in hopes of 'quieting him down', which is precisely what he needed; FT8-A2 does quiet him down without making him a "zombie".

independent cortical mini-column processing. Essentially, amplitude reduction increases the signal to noise ratio in the brain and therefore increases the contrast between figure and ground. The Neurofeedback protocol emphasizes collateral inhibition and promotes the development of inhibitory synapses[8]. Additionally, almost every session of Neurofeedback and nearly every session in the entire course of therapy made use of eye tracking, borrowed from the EMDR protocol, because of its information/memory consolidation properties.

By the next time he was seen, session #2, June 24, 2009, his mother had already noted a difference. By session #4, Alec told me that he was able to concentrate a lot better. Although it was still difficult to understand what he was saying because of his rambling associations, his mother reported, "He thinks before he does things now." By session #6 he had passed the dock test at summer camp. His mother reported, "He is now consistently maintaining himself in his lessons. He listens and understands more. He's concentrating. For him to be consistent in swim lessons is a big thing."

Determining The Neurophysiological Issues Requiring Individual Protocols

Now that we had begun to notice a change by quieting his brain through the limbic system he needed to separate and individuate to facilitate further maturation. Using FT8-A2 resulted in a decrease of anxiety. What would happen if the same protocol were used at FT7-A1? Experimenting with this protocol had revealed a subtle disconnection from codependency, a cognitive shift one would ascribe to the left hemisphere, the analytical part of the brain. Alec's mother had reported that he was overly attentive to her emotions and he himself reported being aware of what his mother was thinking or feeling. Delta, Theta and Alpha amplitude reduction at FT7-A1 was conducted, from session #8 through session #12, over a month's time. At session #12, the last one in the series of the FT7-A1 protocol, something occurred that, although it concerned his mother, was clearly another developmental milestone. She reported that he had become more outspoken and defiant recently. Parental counseling assisted Mrs. V. to understand the normal, developmental nature of that change and how to deal with it.

[8] Cf. Kip E. Patterson, 2013, submitted for publication.

When Alec reported how frightened he was of his father, treatment briefly returned to FT8-A2 for one session, to again inhibit limbic hyper-reactivity. Though the issue had been present for a long time, he finally felt safe enough to talk about it.

The psychiatric care of a youngster requires protecting and supporting natural neurological and social maturational development. For that to occur, good relationships with peers are essential. Alec's relationship with his peers was negatively affected not only by his clumsiness but by doing inappropriate things on the sports field. One example he reported was that when taunted by his peers, he would lay down on the soccer field and begin to do somersaults. This in turn intensified the taunting. We began to focus on proprioception by using the protocol of decreased amplitude of Delta, Theta and Alpha at P3-A1, the Orientation Association Area in the left parietal lobe[9]. The goal was to help him get a better sense of being in his body, better physical self-control and to mitigate against the dissociative symptoms that were part of his defensive structure. We continued the P3-A1 placement for five sessions after which he reported that he was beginning to enjoy gym. The connection with his body resulted in a level of self-confidence allowing him to begin to explore making friends despite being picked on by some of his peers. The developing adolescent preoccupation with his own appearance was revealed as he asked the psychiatrist whether he, Alec, was losing weight.

By session #13 he was reported to be sleeping better. By session #19 in addition to reporting that he was doing well in gym class and in chorus, he had also begun to sleep in his own bed. These developments were related to the sessions we had done at P3 – A1, enhancing the proprioceptive awareness of his own body.[10] This awareness

[9] For a description of this area, see Newberg, D'Aquili and Rause Why God Won't Go Away, page 28.

[10] Johnson Susan, MD in Teaching Our Children to Read Write and Spell *in Lilipoh*, Issue #43, vol.12, Fall 2007, (part I The Proprioceptive System). In line with Jean Ayres' foundational work on sensory integration, (Sensory Integration and the Child, 1979*)* Johnson connects reading difficulties to unrecognized delays in *bilateral integration, one symptom of which is difficulty going to sleep alone*: "Children develop a sense of where their body is in space (proprioception), and even if their eyes are closed, the children will be able to feel or sense the location of muscles, joints and tendons within their trunk, arms, legs, fingers, and toes. In addition, as the children move their arms, legs, hands, and feet forwards, backwards, up, down, left and right, they will start to gain a sense of the spaces around them (…) Beyond being able to sit still and having a visual memory for abstract forms… it

brought him into contact with feelings of humiliation, which we addressed. At that same session he reported, "Dad is not being mean anymore."

At session # 20 he reported that he was having nightmares. Being better integrated with his body, he was more aware of his emotional self and these emotions found their way into his dream life.

He had started to talk about humiliation. It was time to begin work on improving his self-image. We began this work by using the Delta, Theta and Alpha amplitude reduction protocol at T3-A1, because the left temporal lobe is an area of logical sequencing and cognitive constructs and the locus T3-A1 deals specifically with a more realistic attitude towards the self. That was done for four sessions, #s 21 and 22 and again at #24 and 25.

By session #23 Mrs. V. had consulted with the Principal and the Psychologist, who reported that Alec was, "very bright."

Alec was encouraged to expand the discussion of his feelings. He was able to say that he had felt hurt, lonely and embarrassed at the hands of his father. This was a much more detailed account than he had given previously. By session #25, still having Neurofeedback at the T3-A1 site, he reported on the treatment. "The treatment helps me have good days – helps my brain calm down so I can pay attention." It was at this time that his art teacher said, "I don't know what he is eating for breakfast but he sure is paying attention in class." His developing level of self-confidence opened the way to begin regulation of stress levels, affective surges and hyper-reactivity by learning EFT. Both Alec and his mother learned this technique.

At session #26 he reported feeling very intensely embarrassed in school. The teacher had been annoyed. He thought she was yelling at him and the other children

---

also affects their ability to fall asleep by themselves at night and to stay asleep throughout the night. When the proprioceptive system is not fully developed, children (…) frequently wake up during the night and then need physical contact with their parents in order to fall back to sleep. Since their own proprioceptive system is not yet developed, lying next to their parent will activate their pressure receptors and allow them to feel their body, relax, and fall back to sleep. For these children, closing their eyes at night makes their body disappear because their mind has not made a connection to the pressure receptors within their muscles, tendons, and joints."

laughed. Neurofeedback was provided at FT8-A2 with the previous protocol and we discussed his feelings of embarrassment. As his passive-aggressive behavior shifted to confrontation it was time for Alec to learn to modulate his own reactions. His response to his jeering peers became overtly aggressive at times, which, on the one hand was a vast improvement but at the same time created a behavior problem in the teachers' eyes. This paradoxical development led to an example of snap diagnosis when a teacher opined to his mother, "He must be bipolar."

By session #28, having worked on his anxiety, his depression, his sense of his own body and his attitude towards himself, he demonstrated his ability to experience a painful affect, hold it in consciousness and finally report it.

We continued our travels on the royal road to the unconscious as he reported on dreams and a history of conscience development that occurred when he was much younger. This was part of a long conversation about inner voices he had heard when he was 2 years old. There would be more discussion of these inner voices at a later time. At this time he was able to sublimate some of his hostility into wonderful, creative humor by saying to his longhaired psychiatrist, "Did I mention that the bad conscience in my dream had long hair?"

At session #31 he reported that he was trying to change but that his teacher's attitude was not changing. No longer so afraid of authority and with a newfound capacity to observe himself and his teacher, he voiced his disappointment. In any interaction with this teacher he reported feeling frustrated and underneath that, hurt. (This, by the way, was the same teacher that the psychiatrist had noted to be rather rigid.) By session #32 his mother reported, "He's brilliant. He's memorizing the multiplication tables very easily." While the cognitive improvement was real, the anxiety was still present, exhibited by abnormal hand movements. The time seemed appropriate to use EMDR. He became centered, calm, and those movements were reduced.

Clearly Alec was still having emotional problems in school. He was still getting the room pass and remaining in the lavatory for the whole class rather than finding a more appropriate coping mechanism. Since he was still being driven by his emotions (right hemisphere) and not engaging his thinking (left hemisphere), it was decided to work on

connecting the two hemispheres to integrate his thinking as a way of enhancing his coping skills. In order to eliminate the static in the cingulate gyrus and the corpus callosum, thus facilitating a clearer passage between the two hemispheres, Neurofeedback was done in the areas AFZ and FPZ, inhibiting Delta, Theta and Alpha. By session #35 the reports from the teachers and his school psychologist had all noted improvement.

At session #37, while discussing his internal voices, Alec told the psychiatrist, "My brain thoughts talk to me." (Here was evidence of the developing trust of a male authority figure.) Too often the mental health system views a hallucination as a psychotic phenomenon. In this case, and in others in this psychiatrist's experience, it was indicative of a dissociative process. I asked him, "Whose voice does it sound like?" "Mine," he responded. "Makes me feel not alone, sometimes. It comforts me." As a result of his poor communicative skills he was a lonely, isolated boy. He used effective soothing by means of his underdeveloped neurological system and as is normal in a younger child, he talked to himself. By identifying his own voice he demonstrated excellent reality testing, a good prognosticator of therapeutic success.

Despite his good progress in several areas he was becoming depressed. The depression was treated with Neurofeedback instead of medication: as demonstrated by previous NFB research, when the amplitude of Alpha is greater in the left prefrontal area than the right, depression is often the result. Since the brain responds more favorably to Neurofeedback via inhibition, Alpha *amplitude inhibition in the left prefrontal lobe* is preferred to *amplitude enhancement in the right prefrontal lobe*. From session # 39 to # 43, the protocol used was FP1-A1, inhibiting Delta, Theta and Alpha.

At session #45 he said, "I'm afraid to go into Middle School because they have harder homework." This was most likely the cause of the depression and an old belief system reappeared. Once again he believed that he was dumb. At session #46 we changed from FP1-A1 to FT7-A1 to help detach him from that belief. Not only is this protocol useful in helping to separate from a codependency, it works as well to separate from an erroneous belief by facilitating a cognitive capacity of discernment. EMDR was added to center and calm him.

During this time in the treatment course, his mother reported that he was on an even keel. Alec reported that he was still hallucinating adding, "but I don't listen to the bad stuff." He said that he was happy and proud of himself. He continued to report what he was feeling in response to things that happened in school. These feelings seemed to be appropriate to the situations.

While he was at Summer Camp, communication skills came to the fore: a peer with whom he wanted to develop a friendship was calling him names. This suggested working on Broca's area (FC5) to improve his use of language, which would assist in his interpersonal relationships as well as with his schoolwork. By the next session he had made friends with this peer. He was now also reasoning verbally, "Seeing you makes me happy and when I'm happy I'm calm and when I'm calm I'm good."

Session #52, having enjoyed himself at camp and having had training at FC5 – A1, Broca's speech production area, as well as a session of EMDR, he said, "I feel calm and excited at the same time." According to his mother he had never done so well socially. Interspersed with the work on Broca's area (session #s 51, 52, 53 and 55) we worked at T3-A1 to enhance self-esteem, (session #s 54, 56, 57 and 58). This work was reflected in his dream life: from nightmares he progressed to dreams of being a hero. In one he was a super hero and had saved the earth from destruction.

At session #60 he reported the first day of school as being, "Awesome." At session #63 his mother complained once again that he was disagreeing with her, an indication of his continuing psychosexual development.[11] At that same session his mother complained that he did not come when she called him because he was engrossed in reading. This transition of reading from a frustrating activity to a pleasurable one, coming in tandem with the development of greater confidence in his body, success on the sports field and becoming able to sleep in his own bed is consonant with studies on the connection between proprioceptive maturation and reading acquisition.[12]

At session #64 he showed an active, conscious awareness of a process that heretofore had been automatic: "I put myself into a trance." However, dissociation was isolating him from himself and others. In order to facilitate his sense of being in his

[11] cf. Eric Erickson, Childhood and Society, 1963

[12] cf. Johnson S, op.cit.

body, Neurofeedback was again focused at P3-A1[13] for sessions #'s 65, 66 and 67. A neurological workup was requested to rule out petit mal seizures. [14]

By session #65 he was doing better in school. He had caught up in his cursive writing, with which he had difficulties and which he had greatly resisted.

At session #68, after 3 sessions of P3-A1, #s 65, 66 and 67, he actually described the sensorimotor experience of his humiliation. He said that his teacher was cross and sent him for his lesson book. He remained in the restroom for the entire period feeling too humiliated to return. Given the intensity of his reaction and its debilitating effect we resumed Neurofeedback at FT8-A2 with Delta, Theta and Alpha amplitude reduction to decrease limbic system hyper-reactivity.

The treatment goal at this point was to help Alec learn that he *could* be upset by life at times and that he could get through it. With the combined use of EFT, (to decrease the intensity of painful emotions) as well as eye tracking from EMDR (to help center him) and exploratory psychotherapy, his strong defenses slowly gave way and he began to interact appropriately.

By session #73 he was student of the month, and a month later he reported his desire to "be on the honor roll by the end of the year." This development in his sense of pride was a far cry from his previously expressed self-contempt. His mother reported some time later that he had taken on the responsibility of making sure his work was in on time. By session #79 all of his grades had improved. A "D" in science became an "A" In all other classes he received a "B".

However, as some of his self-image improved and he gained strength and capacity in self-observation, other issues surfaced. For example, during Session # 80, he let the psychiatrist know that things in school were improving then he suddenly turned away, refusing to make eye contact. This usually meant that he was experiencing emotional pain. The divorce was suggested as an explanation for his behavior. "Yeah" he said, "I'm sad and it can't be quenched." He would not talk about it further that day.

---

[13] cf. Newberg, D'Aquili and Rause, op.cit. , p. 28 on The Orientation Association Area)

[14] cf. the earlier mention of his traumatic birth and Apgar of 1 as well as his sister's reported early history of seizures.)

He began to notice other things. He took on the responsibility of doing something about issues of which he was not very proud and as they improved, his self-image improved. After a session of Neurofeedback facilitating the integration of his right and left hemispheres he spontaneously reported with great enthusiasm, "I understood my homework last night." Teachers reported that he beamed when praised.

At session #85 he reported, "I got an "A" in math. I think I'm on the honor roll." We then began to focus on his sense of shame as he compared himself with his peers. Here a piece of reality testing was used to help normalize his experience. He seemed surprised when he was told, "Everyone makes mistakes and experiences shame." That brought us to solutions. We began to focus on allowing Alec to experience the emotion and name it. Next we developed an EFT program so that he himself could do something effective about his feelings of humiliation and frustration. Since he had a problem *telling* me that he felt triggered, we decided to choose a *signal* he could give. He could ring a bell, something he liked to do, bringing pleasure to an uncomfortable task. Here we could focus on the two things he and his mother learned to use for regulating intense emotions. He had been taught EMDR and EFT. As we practiced these techniques, they became familiar to him thereby gaining another level of control. In addition to the EFT and EMDR, his mother was taught how to do Skull Tapping and Face Tapping.[15] At session #89, he felt triggered and rang the bell. He requested that we do some EMDR: we did so and as a result, he felt better.

It is one thing to learn that one can respond differently to emotional states. It is another to engage in working through the task of being able to realize one is having an intense emotion, stay with it and struggle through the process of actually dealing with it. Here, Alec's temperamental trait of Persistence came in handy.

---

[15] These techniques were brought to my attention by Elizabeth Frishkoff, MSW, teaching the first level of HANDLE training. The HANDLE techniques were developed and described by Judith Bluestone, Ph. D. in her book *The Fabric Of Autism,* pgs.185-187 & 192-193. Face Tapping, "(…) awakens, organizes, integrates and relaxes the trigeminal nerve (…) producing many benefits including increased facial muscle tone for non verbal expression, integration of facial and tactile sensations, alleviation of headaches, etc. It also supports speech production as well as hearing and vision and may give rise to a sense of calmness." Skull Tapping, "enhances inter-hemispheric integration, and also provides gently organized simulation of the sensory motor cortex. It brings energy, blood flow, and oxygen to the brain to increase general alertness."

He was still being picked on in school but instead of dissociating, as he had done in the past, he now struggled with the emotional pain. For example in session #91 he came into the session with his head bowed and silent. Skull tapping and face tapping finally relaxed him and he was able to communicate a humiliating experience at camp. He had thrown his tennis racket down on the court and run to the bathroom. Once there, he washed and dried his face. Feeling better, even though the kids laughed, he came back, sat on the bench as the kids fell silent.

In the next session, #92, he addressed the dissociative process. He was dissociated but he was describing the experience. "Sometimes I think I'm somewhere else, doing something out of the ordinary. Sometimes I get caught in Never Never Land… Sometimes my brain simulates things I don't want to see." It was at this session that he complained that when he was laughed at in camp, no adult helped. He kept asking the psychiatrist to repeat what had been said in an attempt to be in the present and eventually he hit the gong, signaling that he had been triggered. He chose to sit silently and that choice was respected.

During the next session he was again very distractible. This was brought to his attention and connected to his memory problems. It was explained to him that in order to remember something one must focus one's attention on what is to be remembered. When your eyes are constantly roving, you cannot focus on anything, consequently you cannot remember anything. The session was ended with EMDR after which he remarked that the EMDR produced a "great feeling."

Session # 94 occurred after his first day back at school. "It was great. I loved it. I feel good about myself. I have a warm feeling that says I'm gonna do great. I'm remembering things better. Things I forgot in the past." During session #95, his mother exclaimed: "I have a new boy!" Alec reported, "I'm getting good grades in math," while being happy to be back in school. He was very cooperative, was more confident than ever previously observed and his walk was proud.

During session #96 something was bothering him. He had reported getting 105% on a math test, the highest possible grade, but he was still being made fun of at school. Now, he was picked on for his pride. "You think you're so cool!" he was told. It was too much. Damned if he did and damned if he didn't. Despite his having learned about

ringing the bell to signal he had an emotion, he stopped sharing what he was experiencing as though holding on to himself.

At session #98 he came late and refused to come into the office from the waiting room. There was lots of talking there, and yet only about whether or not he would come into the office. It seemed as though he was preserving his sense of self and surrounding it with an emotional moat. At that session he never revealed what it was with which he was struggling.

At session #99 he came late again. He seemed pressured. He was embarrassed and refused both EFT and EMDR. "Mom said she won't pay me for coming here. Dad won't give me an allowance." He then shut down and when asked whether he was angry or thinking, Alec said that he didn't know. When asked why his mother had cut his allowance he refused to answer but began to play with the bell, thereby skirting around the topic — the subject of money. He talked about other subjects but wouldn't come back to the money issue. He seemed to be simply enjoying the therapeutic closeness.

At session #100 we reviewed his progress from the time when we began to work up to the present. He blushed, as he understood. We talked about the expression of his will and his need to care for *himself*. "I get overwhelmed," he said. We then focused on self-soothing making good use of EMDR, together. He became sleepy but calm.

At session #101 he asked about ignoring insults and about times when he doesn't want to talk. Here, with his newly acquired sense of self, he was struggling with something and wasn't sure he wanted to talk. He became irritable and eventually apologized without having been asked to do so. In session #103 he said, "The sessions help me ignore the life I'm in. I don't care what people call me. I am still getting bullied but I don't mind so much; not as much as last year."

During session #105 he discussed his previous week's session, then became cocky. He apologized. The emotional oscillation he was experiencing, including overshooting the mark —i.e.: too much ego was explained to him. He understood. He became more socially aware and polite.[16] EMDR resulted in the expected relaxation and centering.

In session #106 he remarked, "I get judged by the way I look and the way I act."

[16] The first glimmer of genital phase of psychosexual development.

There followed long discussions about the pros and cons of losing weight and about the vicissitudes of friendships. We ended the session with EMDR.

During session # 108, he reported doing quite well in school, both academically and behaviorally. He achieved The Student of The Month, award. "School is something tough to get through. I stay during lunch and after school. I'm starting to think of myself as a good person instead of a dumb ass. I've experienced changes in myself in the last two years." Then he said," I have confidence in tests and quizzes and I've learned to study more and it's okay; better than in 5th grade." So he was engaging in cognitive planning and reflection, a huge change from the emotionally driven, depressed boy he had been at the beginning of his therapy.

At the next to last session, #109, when asked how he felt about himself, he responded with, "Improvement of two years. I feel more alive and not little anymore. Anxiety, sometimes when the teacher calls on me. I panic, sweat and don't know the answer. Sometimes it comes to me." He followed this with, "I like novels. I read a 443 page novel in a week."

During session #110, which turned out to be his last treatment session, we reviewed his phenomenal progress. He was able to perceive and express how far he had come, able to identify his emotions and sit with them as he continued to work on the construction of his sense of who he is. His mother was able to reveal and deal with the similarity between Alec and his father, and how that played out in her relationship with Alec.

A week later, his mother called to say that Alec was so busy with afterschool activities that he really didn't have time to continue therapy. During a follow-up phone call two weeks after therapy had concluded, his mother reported that he was doing very well in school and was active in after school sports. In another follow up call, shortly before the undertaking of this article, his mother repeated how well he was doing both academically and behaviorally.

Alec actually called back after his mother told him about the phone call, to relate that he was very happy with his treatment, that he was now on the high honor roll and that he was a member of the Junior Honor Society in his school.

RECAPITULATION

Thus ended on a triumphant note what had started out as a complex treatment, the ultimate success of which was far from self-evident. This vindicated the choice of an approach in which Neurofeedback, fully integrated with other modalities, provided a running thread while trauma-informed psychotherapy provided the overarching framework, as the patient 'became a Self.'

Integrating Neurofeedback with other treatment modalities requires on the therapist's part a willingness to be more dynamic and less dogmatic, since as one issue such as anxiety is resolved, another, such as poor attention skills, might be revealed. In effect, successful resolution of problematic issues using Neurofeedback and other forms of psychotherapy may reveal other deficits that can be addressed in turn.

The treatment of this preadolescent required *discovering and understanding who this young person actually was.* As described by his mother and teachers, his presenting symptoms fell within the autistic spectrum (dyspraxia, difficulty with verbal communication, eccentric and disruptive behaviors, learning difficulties, high anxiety, hyper-reactivity, poor sensory integration, difficulties with sequencing and coordination). But the warm-hearted child I met in my office failed to meet a key criterion for the Asperger diagnosis with which he had most recently been labeled.

It was immediately clear that there were underlying developmental deficits related to early traumatic experiences. Furthermore, whatever the underlying neurophysiological problems might be, they had been masked and compounded by misdiagnosis and the inappropriate pharmaceutical approach based on that misdiagnosis.

The patient's history of prenatal, perinatal and neonatal trauma (i.e., Developmental Trauma) provided the first major clue to the direction the treatment would take. Since trauma-induced anxiety was like a static overriding mental processes, it would have to be reduced so that the processes themselves might be studied. Hence the choice to start the treatment with a Neurofeedback protocol

designed to decrease arousal, complemented with EMDR. This facilitated focus, albeit inconsistently at first. The patient's mother started to notice positive results as early as the second session.

With this baseline established, it became possible to work toward neurological and personality maturation. This was done using Neurofeedback protocols designed to address different functions located at different areas of the brain. Due to the developmental delays in infancy caused by his overactive sympathetic nervous system, it was necessary to conduct in parallel the construction of the foundational skills of self-awareness and coordination appropriate to a very young child as we helped him develop his budding age-appropriate cognitive, emotional and social skills. It is important to note that development occurred in a non -linear way: the undertow of old habits and expectations would recur whenever stressful events triggered earlier experiences of humiliation. The initial calming protocol was often required at the beginning of a session.

The first 'specialized' protocol was a protocol addressing codependency issues — parental counseling was provided to help the patient's mother adjust to new poorly modulated self-assertive behaviors elicited by this change.

Once the young patient was able to perceive and name emotions that had long been dissociated, it became necessary (and possible) for him to become proprioceptively connected with his own body.

Neurofeedback offered a protocol which jumpstarted this development. This new protocol would help maturation of his physical and cognitive skills as well as opening windows into the world of relationships with his peers. Soon he was able to participate more comfortably and successfully in gym and chorus. Reports from the school to his mother were much improved from the past: he was reported to be bright and able to pay attention in class. Now that he was feeling his own body, he also became comfortable sleeping in his own bed.

Humiliation was a predominant emotion. After working on his experience of being in his body, the task of improving his self-image was done successfully with a

'specialized' Neurofeedback protocol. Again, there were examples of overcompensation, causing a teacher to suggest a label of Bi-Polar Disorder.

He became able to perceive and eventually discuss in more detail his emotional experiences, as well as providing personal evaluations of the result of his treatment. His developing level of self-confidence opened the way to begin self-regulation of stress levels, affective surges and hyper-reactivity by learning EFT so that he, himself, could take control of his emotional states.

The patient engaged in learning to modulate his aggressive drive requiring him to take notice of a state of sympathetic nervous system arousal, contain himself and think before he acted. This he did eventually by identifying the emotion, remaining conscious of it in order to talk about it. Next he began to notice things about adults that were problematic. Here too he was becoming age appropriate.

At that point he was still occasionally using the room pass in the bathroom in order to avoid the stress of the classroom, an improvement over the past but leaving him with feelings of humiliation. His stress, (right hemisphere) was not alleviated by good problem solving, (left hemisphere). Neurofeedback was used once again in order to facilitate proper inter-hemispheric cooperation.

A developing depression was treated with another Neurofeedback protocol while he and his mother continued making use of self-help techniques at home.

With the challenge of passage into Middle School, old fears and negative self-expectations reappeared. He needed to use his insights on yet another issue. Each time an issue comes up about which one has developed insight, that insight must be applied to that new situation. This process is known as *working through*. It can be a long and cumbersome process, but is a most important aspect of a successful therapy. He took up the challenge, helped by Neurofeedback at Broca's area (speech area) and an adjacent site connected with attitude towards the self. The combination worked well. This resulted in fine-tuning of his communication with others, especially his peers. In time, the patient became comfortable with reporting inner voices, some going back to this early childhood, some current. Discussing them with his therapist led to the development of excellent reality-testing skills, a prognosticator of therapeutic success.

Discussion about life and its vicissitudes was an ongoing part of his psychotherapy. The signaling of a painful emotion was followed by the ability to discuss it. He showed himself capable of discussing problem issues in greater detail and working on them successfully so that his next first day of school was described as "awesome". His improvement in school and with his peers continued, although irregularly. He complained that now his peers were complaining about his superior attitude. It took more work in session until he arrived at his balance.

Important feedback was provided by the patient's mother and teachers, reporting behavioral changes. More rewarding for the patient and the therapist was the patient's increasingly proactive self-awareness and self-reflectiveness. He became more socially aware, polite, engaged in self-examination about the effects of his actions on others, as well as being an excellent student. As his treatment arrived at a successful conclusion, he was a young man engaging in cognitive planning and reflection, a huge change from the emotionally driven, depressed boy first encountered.

APPENDIX

Chronological stages of Neurofeedback Treatment in Alec's case

Reduce anxiety, inhibit limbic hyper-reactivity:
Delta, Theta and Alpha amplitude reduction at FT8-A2 accompanied by EMDR

Address codependency issues
Delta, Theta and Alpha amplitude reduction at FT7-A1

Proprioceptive Awareness:
Decreased amplitude of Delta, Theta and Alpha at P3-A1, (Orientation Association Area in the left parietal lobe)

Self-Image:
Delta, Theta and Alpha amplitude reduction protocol at T3-A1 (the left temporal lobe is an area of logical sequencing and cognitive constructs and the locus T3-A1 deals specifically with a more realistic attitude towards the self)
Complemented with EFT

Inter-hemispheric Integration: eliminate the static in the cingulate gyrus and the corpus callosum, thus facilitating a clearer passage between the two hemispheres, Inhibiting Delta, Theta and Alpha at AFZ and FPZ

Depression:
Decreased amplitude Delta, Theta and Alpha at FP1-A1. (When the amplitude of Alpha is greater in the left prefrontal area than the right, depression is often the result as demonstrated by previous NFB research. Since the brain responds more favorably to Neurofeedback via inhibition, *Alpha amplitude inhibition in the left prefrontal lobe* is preferred to *Alpha amplitude increase in the right prefrontal lobe*).

Communication Skills:
Work with Broca's Area FC5-A1 (Speech production) and T3-A1 (self-awareness, self-esteem)

Sensory-Motor experience of emotions:
P3-A1 combined with EFT, and Eye-tracking EMDR

Throughout the therapy **Eye tracking**, borrowed from the EMDR protocol, was used in almost each session because of its *information/memory consolidation properties,*